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Scientific Method REVIEW SHEET

Use your "Introduction to Science and the Scientific Method" Notes to answer the questions below.

1. The goal of science is to investigate and understand the natural world, to explain events in the natural world, and to use those explanations to make useful predictions.

2. Science deals only with the natural world.

3. Scientists collect and organize information in a careful, orderly way, looking for patterns and connections between events.

4. **Science** - an organized way of using evidence to learn about the natural world.

5. List the 5 steps of the Scientific Method

- a. Observation / Asking a question
- b. Form a Hypothesis
- c. Designing a Controlled Experiment
- d. Recording and Analyzing Results
- e. Drawing Conclusions

6. **Data** - the information gathered from making observations ~~information~~.

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7. There are two types of data:

a) **Quantitative data** are numbers and are obtained by counting or measuring.

b) **Qualitative data** are descriptions and involve characteristics that cannot be counted.

8. A **hypothesis** is a scientific explanation for a set of observations

9. A hypothesis must be stated in a way that makes it testable. The hypothesis is just a possible answer to a question, and it must be thoroughly tested.

10. In the Observation step - A problem or a question must first be identified.

11. In the Form a Hypothesis step - A possible explanation to the question or problem is formed. It is simply a prediction and has not yet been proven or disproven.

12. When Designing a Controlled Experiment, many factors should be considered. **Variables** - the factors in an experiment that can be changed

13. A controlled experiment works with one variable at a time.

14. In a "controlled experiment" only one variable is changed at a time. All other variables should be unchanged or "controlled".

15. An experiment is based on the comparison between a "control group" with an "experimental group".

a) These two groups are identical except for one factor.

b) The control group serves as the comparison. It is the same as the experiment group, except that the one variable that is being tested is removed.

c) The experimental group shows the effect of the variable that is being tested.

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16. The independent variable is the variable that is deliberately changed by the scientist.

17. The dependent variable is the one observed during the experiment. The dependent variable is the data we collect during the experiment. This data is collected as a result of changing the independent variable.

18. When **Recording and Analyzing**, The data that has been collected must be organized and analyzed to determine whether the data are reliable.

19. When **Drawing Conclusions**, The evidence from the experiment is used to determine if the hypothesis is proven or disproven.

20. Experiments must be repeated over and over. When repeated, the results should always be the same before a valid conclusion can be reached.

21. When **Forming a Theory**, A theory may be formed after the hypothesis has been tested many times and is supported by much evidence.

22. A theory is a broad and comprehensive statement of what is thought to be true and a theory is supported by considerable evidence.

In your own words, answer the questions below.

23. Why is it important to have a large sample size in any experiment?

More ~~tests~~ ^{samples} gives more evidence and allows for more reliable results

24. Why is it important to repeat the experiment many times?

To be sure there wasn't a mistake made

25. What is the importance of using a control or a group that doesn't have any "experiment" done on it?

to give a picture of what "normal" looks like so you can compare it to the independent variable data and observe any changes

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26. How is a theory different than a hypothesis?

A hypothesis is an educated guess based on observations
~~and data~~ A theory is a statement of what is believed to
be true based on many experiments and
data

27. Why is it so important that a scientist accurately describes the procedure or steps used in the experiment?

It allows other scientists to repeat
the experiment and verify the
results

28. What is the difference between the independent and the dependent variables in an experiment?

Indep. is deliberately changed during the
experiment (type of pop).

Depend. is the variable that is observed
during the experiment (how high did it spray)

29. What are some questions or problems you would like to investigate in Science class this year?

30. Pick one and write a hypothesis for your question or problem.